

*EQ: How do you determine permutations and combinations and use them to find probabilities?*

The Fundamental Counting Principle tells us how many possible \_\_\_\_\_

we can have when two events are happening: If there are  $a$  possible outcomes on the first

event and  $b$  on the second, then the total number of outcomes is \_\_\_\_\_.

If you spin a spinner with 8 possible outcomes and rolled a 6-sided die, then there are \_\_\_\_\_ possible outcomes.

A permutation will tell us the total number of possible outcomes when \_\_\_\_\_.  
\_\_\_\_\_. That is, if you have the letters A, B, C, and D, how many possible ways can you arrange the letters?

The formula for a permutation is:

$n$  is the total number of objects and  $r$  is the number of objects we take at a time.

A factorial is as follows:

A combination is similar to a permutation, except \_\_\_\_\_.

That is, if I had four books, how many different ways could I carry three of them?

The formula for a combination is:

We can use permutations and combinations to help find probabilities of an event happening:

Example 1: You have 6 pairs of pants, 8 sweaters, and 3 pairs of sneakers.

a. How many different outfits can you make if each outfit has one pair of pants, one sweater, and one pair of sneakers?

b. How many more sweaters would you need to double your total possible outfits?

c. What is the probability you will pick a specific sweater?

d. What is the probability of picking a specific sweater with a specific pair of sneakers?

Example 2: Find the following permutations and combinations.

a.  ${}_{12}C_2$

b.  ${}_{11}P_4$

c.  ${}_6P_6$

d.  ${}_8C_3$

Example 3:

a. In a class of 24 seniors, how many different sets of 2 students can be chosen to represent the class at a school meeting?

b. From the same class of 24, how many different ways can two students be elected to be president and vice president?

c. Why are the results different for parts a and b?

d. What is the probability that, in the class of 24, two particular students are chosen to be representatives?